METAL CASTING

Project Fact Sheet

RE-ENGINEERING CASTING PRODUCTION SYSTEMS; ERGONOMIC IMPROVEMENTS IN FOUNDRIES

BENEFITS

- Improves foundry safety
- Improves productivity
- Reduces work-in-process
- Reduces requirements for material movement
- Reduces scrap and rework
- Reduces energy requirements for rework (estimated savings of 0.18 trillion Btu per year by 2010)

APPLICATIONS

Although this study is focused on the steel foundry industry, the results of this project can be applied throughout the foundry industry. These results will improve conditions and safety for workers while improving productivity and operational efficiency in foundries.

CHANGES IN PRODUCTION PRACTICES IMPROVE PRODUCTIVITY, SAFETY, AND LEAD TIME

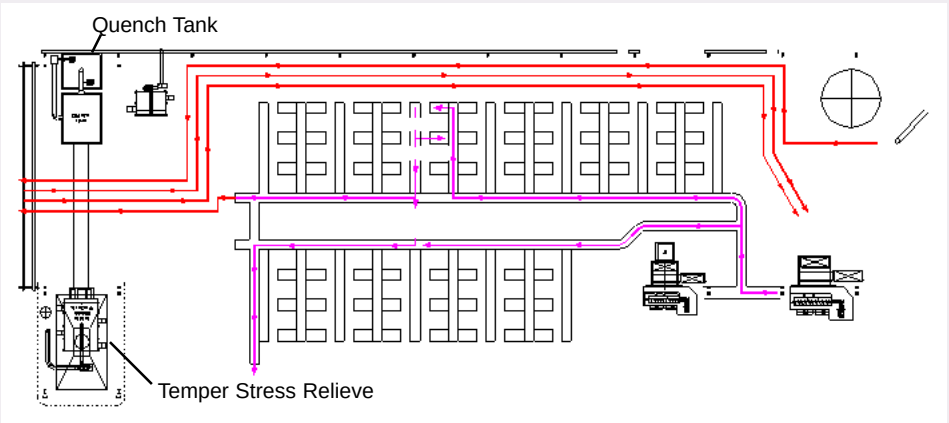
Production practices are being analyzed to identify opportunities for foundry re-engineering which will decrease casting production costs and reduce work-in-process. In addition, ergonomic improvements will increase productivity, lead time, and safety. The goal of the project is to develop solutions that are applicable to the entire foundry industry.

Foundry work involves various manual operations. The wide mix of products, particularly in the steel foundry industry, makes automation infeasible for many segments. In addition, many foundries suffer from poor facility design and large work in process inventories.

In this project, a team from Iowa State University is investigating the entire casting production system to identify re-engineering and ergonomic improvements. Data were collected from participating steel foundries and analyzed. The team also is building simulation models to test these re-engineering recommendations. Recommendations are being made to improve scheduling, inspection and rework practices, plant layout and material handling.

Researchers are seeking to integrate ergonomic thinking into the steel foundry industry. Workshops were held and teams of students are performing ergonomic evaluations at participating foundries and introducing ergonomic concepts. The extensive use of students is training future foundry professionals in ergonomics so that benefits can be transferred to industry when those students enter the workforce.

RE-ENGINEERING FOUNDRY PRODUCTION SYSTEMS



Improved plant layout improves both foundry production systems and ergonomics.

Project Description

Goal: The objective of this project is to provide recommendations for re-engineering casting production systems and to identify ergonomic improvements.

This is a multi-phase project. The first phase, Re-engineering Casting Production Systems, is a three year project which began in March 1998. Follow-on work, Ergonomic Improvements in Foundries, is a two-year project which began in January 2000. A number of promising results have already been seen. In one foundry, the relocation of a piece of equipment by 200 feet has introduced the potential to save 1,500 miles of material movement per year.

Progress and Milestones

Specific tasks include:

Re-engineering Casting Production Systems

Task I - In task one, a literature search was completed and production data were collected from foundries. Participating foundries were surveyed on their production practices. Initial re-engineering improvements were identified.

Task II - In task two, a simulation model was developed and tested for modeling and analyzing re-engineering recommendations.

Task III - In task three, initial recommendations were identified and tested. The impact of recommended changes was identified.

Task IV - In task four, the benefits of recommended changes will be transferred to industry.

Ergonomic Improvements in Foundries

The project will include analysis in three areas in parallel:

1. Reactive Ergonomics - The reactive ergonomic component will investigate currently existing jobs by reviewing records, performing symptom surveys, evaluating jobs for risk factors, performing job analysis (i.e., integrated evaluation of process, productivity, and safety), and recommending redesign options as necessary.

2. Proactive Ergonomics - The proactive ergonomic component will be instituted to prevent work-related musculoskeletal disorders (WMSDs) from occurring. The emphasis will be on efforts to incorporate ergonomics into the design of new processes, jobs, and workstations - designing operations that ensure proper selection and use of tools, job methods, workstation layouts, and process flows.

3. Safety - The safety component will be incorporated into both ergonomic efforts by the use of a group of tools, which will aid the process designer in evaluating their designs/options for hazards, as well as identifying existing hazards in mature processes.

ISU will work with several companies each year to assist them in identifying and correcting ergonomic problems. This direct participation by the companies will assist them in continuing to make improvements at their plants after project completion. Graduate students and senior personnel will be utilized to evaluate and design on-site solutions to identified problems.

Project Partners

Iowa State University, Ames, IA
Steel Founders' Society of America, Barrington, IL
AECCO, Champaign, IL
Atchison Casting, Atchison, KS
American Steel Foundries, East Chicago, IL
Bay Cast, Inc., Bay City, MI
Buckeye Steel Castings, Columbus, OH
Carondelet Corporation, Pevely, MO
Durametal Corporation, Muncy, PA
Erie Bronze & Aluminum, Erie, PA
Falk Corporation, Milwaukee, WI
Harrison Steel Castings Company, Attica, IN
Hendrix Manufacturing, Mansfield, LA
Magotteaux Pulaski, Pulaski, TN
Maynard Steel Casting Co., Milwaukee, WI
McConway & Torley Corporation, Pittsburgh, PA
Monett Metals, Monett, MO
NACO, Lombard, IL
Pacific Steel Casting, Berkeley, CA
Pennsylvania Foundry Group, Myerstown, PA
PrimeCast, South Beloit, IL
Sawbrook Steel Castings Co., Lockland, OH
Sivyer Steel Corporation, Bettendorf, IA
Southern Alloy Corporation, Sylacauga, AL
Southern Cast Products, Meridian, MS
Southwest Steel Castings Co., Longview, TX
Spokane Steel Foundry Co., Spokane, WA
Sulzer Pumps, Easley, SC
Texas Steel Company, Fort Worth, TX
United Machine and Foundry, Winona, MN
Varicast, Inc., Portland, OR
Waukesha, Delavan, WI
West Michigan Steel Foundry, Muskegon, MI
Wisconsin Centrifugal, Waukesha, WI
Wollaston Alloys, Braintree, MA

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